

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 November 2003 (27.11.2003)

PCT

(10) International Publication Number
WO 03/097268 A1

(51) International Patent Classification: **B21D 22/12**

(21) International Application Number: **PCT/SE03/00525**

(22) International Filing Date: **2 April 2003 (02.04.2003)**

(25) Filing Language: **Swedish**

(26) Publication Language: **English**

(30) Priority Data:
0201489-2 15 May 2002 (15.05.2002) SE
60/384,175 29 May 2002 (29.05.2002) US

(71) Applicant (for all designated States except US): **FLOW HOLDINGS SAGL [CH/CH];** Via Cantonale, CH-6805 (CH).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **HELLGREN, Keijo** [SE/SE]; Långhoppargatan 5, S-722 41 Västerås (SE).

(74) Agent: **AWAPATENT AB;** Box 53, S-826 22 Söderhamn (SE).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

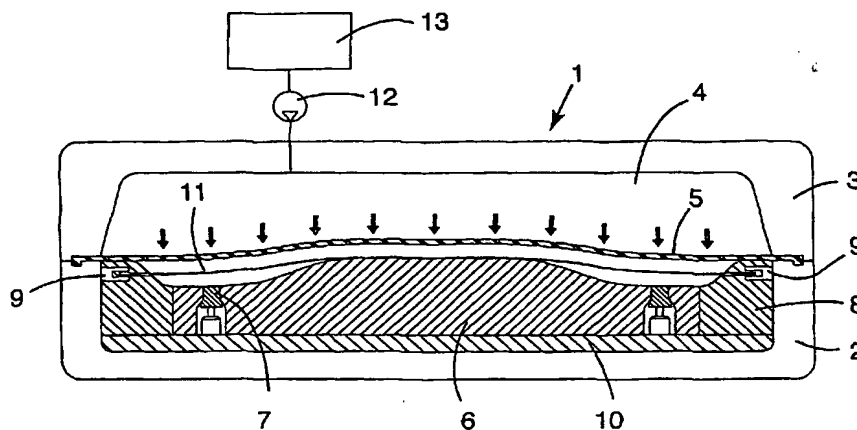
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **FORMING TOOL**



(57) Abstract: The invention relates to a forming tool for forming sheet blanks in a diaphragm press (1) of the kind comprising an openable, closed pressure chamber (4), which is divided in a gas and liquid tight manner by means of a flexible diaphragm (5). The forming tool (6) is adapted to be arranged on one side of the diaphragm and a sheet blank (11) to be formed is adapted to be arranged between the forming tool and the diaphragm. The opposite side of the diaphragm is adapted to be pressurised by a fluid being supplied at high pressure to cause the flexible diaphragm to deform and, thus, the sheet blank to be pressed against the forming tool. The forming tool (6) comprises an elongate cutting and flanging tool (7) along at least part of its periphery and/or around an intended opening in the sheet blank (11). The cutting and flanging tool (7) has a cutting edge and is displaceable, with the aid of actuating means, in an elongate slot in the forming tool towards and away from the plane of the diaphragm (5). At a first pressing pressure, the sheet blank is caused to be cut off against the cutting edge and, as the pressure is continuously increased, the cutting and flanging tool is caused to be displaced into the slot in the forming tool, so that the peripheral edge of the sheet blank is deformed towards the interior of the slot during forming of a flanged edge.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/00525

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B21D 22/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B21D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
D,A	EP 0288705 A2 (ASEA BROWN BOVERI AB), 2 November 1988 (02.11.88), figure 3, abstract --	1-5
A	DE 19951850 C1 (METALLWARENFABRIK REICHERTSHOFEN KARL BINDER GMBH), 25 January 2001 (25.01.01), column 3, line 57 - column 4, line 4, figure 5, abstract --	1-6
A	US 6178796 B1 (KEIJO HELLGREN), 30 January 2001 (30.01.01), abstract --	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

11 June 2003

Date of mailing of the international search report

17-06-2003

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Katarina Ekman/MP
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 03/00525

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5649438 A (HERBERT L. HALL, JR. ET AL), 22 July 1997 (22.07.97), abstract --	1-6
A	DATABASE WPI Week 198320 Derwent Publications Ltd., London, GB; Class P52, AN 1983-G7164K & SU 940930 B (AS USSR URALS POLYM), 07 July 1982 (1982-07-07) abstract -- -----	1-6

INTERNATIONAL SEARCH REPORT

29/04/03

International application No.

PCT/SE 03/00525

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
EP	0288705	A2	02/11/88	DE 3709181 A JP 1015230 A	29/09/88 19/01/89
DE	19951850	C1	25/01/01	NONE	
US	6178796	B1	30/01/01	AU 4665299 A CN 1095705 B CN 1303324 T EP 1091815 A TW 472005 B US 2001000413 A WO 9962652 A	20/12/99 11/12/02 11/07/01 18/04/01 00/00/00 26/04/01 09/12/99
US	5649438	A	22/07/97	AU 2695295 A WO 9534389 A ZA 9504934 A	05/01/96 21/12/95 14/05/96